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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/823,724	04/14/2004	Steven T. Fink	071469-0309185	4791
909	7590	10/16/2006	EXAMINER	
PILLSBURY WINTHROP SHAW PITTMAN, LLP			DHINGRA, RAKESH KUMAR	
P.O. BOX 10500			ART UNIT	
MCLEAN, VA 22102			PAPER NUMBER	

1763

DATE MAILED: 10/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/823,724

Applicant(s)

FINK, STEVEN T.

Examiner

Rakesh K. Dhingra

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) 4-9 and 28-34 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 10-27 and 35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-35 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 04/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of group I, species 1 in the reply filed on 8/1/06 is acknowledged. Applicant's argument regarding the method claim 35 having common limitations with claim 1 is found persuasive. Therefore restriction requirement of apparatus and method is withdrawn and accordingly claim 35 has been examined as explained below. However applicant's argument regarding restriction requirement of species is not found persuasive since the invention contains claims directed to patentably distinct species which would require search in different classes/sub-classes for example in class 118/723MW (for microwave plasma sources) and in class 118/723I for inductive plasma sources etc. Thus restriction requirement of species is maintained.

The requirement of species restriction is therefore still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1) Claim 1 recites the limitation "support assembly" in line 10. There is insufficient antecedent basis for this limitation in the claim. For the purpose of examination on merits this limitation has been interpreted as "support structure".

2) Claim 21 recites the limitation "said vacuum chamber" in line 1. There is insufficient antecedent basis for this limitation in the claim. For the purpose of examination on merits this limitation has been interpreted as "process chamber".

Claim Rejections - 35 USC § 102

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The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 27, 35 are rejected under 35 U.S.C. 102(e) as being anticipated by Verplancken (US PG PUB No. 2004/0071897).

Regarding Claims 1,2, 27,35: Verplancken et al teach an apparatus and method (Figure 1) that comprises a process chamber 100, a vertically movable support pedestal (chuck assembly) 148 supported by a support shaft (support structure) 148A and a plasma source assembly 200. Verplancken et al also teach that pedestal (chuck) can be moved up/down using a lift mechanism (part of support shaft 148A). Verplancken et al further teach that plasma source can be a capacitively coupled plasma source. Verplancken et al also teach that plasma generator 200 is disposed on the upper top surface (top wall 120A- holding structure) of the chamber (abstract and paragraphs 0020-0024 and 0029).

Claims 1- 3, 15, 17-19, 21, 25, 26 are rejected under 35 U.S.C. 102(e) as being anticipated by Harvey (US Patent No. 7,037,376).

Regarding Claims 1-3: Harvey et al teach an apparatus (Figures 1A, 1B) that comprises a process chamber 15, a vertically movable pedestal (chuck assembly) 12 supported by a support shaft (support structure) and a plasma source assembly (comprising of face plate 13a besides the pedestal 12) that is held by gas distribution manifold (holding structure) 11. Harvey et al also teach that plasma source is a

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capacitively coupled plasma source with face plate 13a acting as electrode that is adjacent to pedestal 12 and defines a plasma region between pedestal 12 and itself (column 4, line 18 to column 5, line 15).

Regarding claim 15: Harvey et al teach that apparatus includes utilities (utility via assembly) in the shaft 148A that provides utilities to wafer pedestal 148 (Figure 1 and paragraphs 0026-0030).

Regarding claims 17, 18: Harvey et al teach a gas supply system 7, 8, 9 and 11 in communication with the process chamber 15 (Figure 1B and column 4, lines 25-50). Further, type of gas to be used in the gas supply system is an intended use limitation which the apparatus of prior art is capable to supply, absent any criticality in the disclosure.

Regarding Claim 19: Harvey et al teach robotic system (not shown in drawings) that arranges to transport wafer onto pedestal 12 through insertion/removal opening 26 in the side of chamber 10 (Figure 1B and column 7, lines 10-20).

Regarding Claim 21: Harvey et al teach that chamber comprises sidewalls 15a and configured (adapted) to be a pump (not shown in drawing) for chamber exhaust through exhaust ports outlet 25 (Figure 1B and column 5, lines 35-55).

Regarding Claims 25, 26: Harvey et al teach face plate (chamber plate) 13a which is held with the manifold (holding structure) 11 and injects gases in the vicinity and opposite the pedestal 11 (Figure 1B).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 10, 11, 19, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harvey (US Patent No. 7,037,376) in view of Nakano et al (US Patent No. 6,899,787).

Regarding Claims 10,11: Harvey et al teach all limitation of the claim including RF supply 44 connected to plasma electrode (face plate 13a) but do not explicitly teach impedance matching network and its mounting.

Nakano et al teach an apparatus (Figure 2) that includes a showerhead electrode 4 connected to RF supply 1 via RF matching network are held by the chasis 21 (holding structure) [column 24, lines 20-55].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a matching network held by the holding structure as taught by Nakano et al in the apparatus of Harvey et al to minimize loss of power supplied to plasma due to leakage(column 3, line 50 to column 5, line 15).

Regarding Claim 19: Harvey et al teach robotic system (not shown in drawings) that arranges to transport wafer onto pedestal 12 through insertion/removal opening 26 in the side of chamber 10 (Figure 1B and column 7, lines 10-20).

Regarding Claim 20: Nakano et al teach that system comprises a transfer chamber (robotic chamber) 72 and gate valve 76 for interconnection with heating chamber 79 (like processing chamber) [Figures 1, 7 and column 28, lines 40-42].

Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harvey (US Patent No. 7,037,376) in view of Jeon (US Patent No. 7,018,505).

Regarding Claims 12,13: Harvey et al teach all limitation of the claim including a support structure for supporting the chuck but do not teach chuck impedance matching network supported by said structure.

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Jeon teach an apparatus (Figure 2) that includes a chuck 130 and a matching box 174 fixed to support structure by fixing means 200 [column 3, line 60 to column 4, line 55].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a chuck matching network held by the chuck support structure as taught by Jeon in the apparatus of Harvey et al to ensure that RF power is reliably and effectively supplied to chuck (column 2, lines 38-43).

Regarding Claim 14: Jeon does not explicitly teach impedance matching network for bias supply to chuck, however it is known in the art to use matching network for bias supply to chuck. Further it would be obvious to use similar mounting /fixing arrangement for impedance matching network as taught by Jeon to ensure that bias power is reliably and effectively supplied to chuck.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harvey (US Patent No. 7,037,376) in view of Zhao et al (US Patent No. 5,558,717).

Regarding Claim 16: Harvey et al teach all limitation of the claim including thermocouple (temperature regulating mechanism) 150A as part of utilities assembly.

Harvey et al do not teach cooling systems in the utilities assembly.

Zhao et al teach an apparatus (Figures 11-13, 22, 23) that includes cooling duct 204 (cooling system) for cooling the wafer pedestal [column 12, lines 15-25 and column 13, lines 13-20].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to provide cooling system as part of utilities as taught by Zhao et al in the apparatus of Harvey et al to obtain capability for accelerated cooling of the pedestal.

Claims 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harvey (US Patent No. 7,037,376) in view of Hanawa et al et al (US Patent No. 6,634,313).

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Regarding Claim 22: Harvey et al teach all limitation of the claim including vacuum system for exhausting gases from the chamber.

Harvey et al do not teach that vacuum pump is turbo molecular pump.

Hanawa et al teach an apparatus (Figure 1) that includes a plasma apparatus with a vacuum system including a turbo molecular pump 82 (column 4, line 65 to column 5, line 3).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a turbo molecular pump in the vacuum system as taught by Hanawa et al in the apparatus of Harvey et al to obtain high speed pumping for achieving vacuum quickly (column 5, lines 5-15).

Regarding Claims 23, 24: Hanawa et al teach that TMP 82 is arranged symmetrically to an axis of substrate support (chuck) 74 to enable pumping of gases symmetrical to chuck axis (Figure 1).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Rakesh Dhingra



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Art Unit 1763